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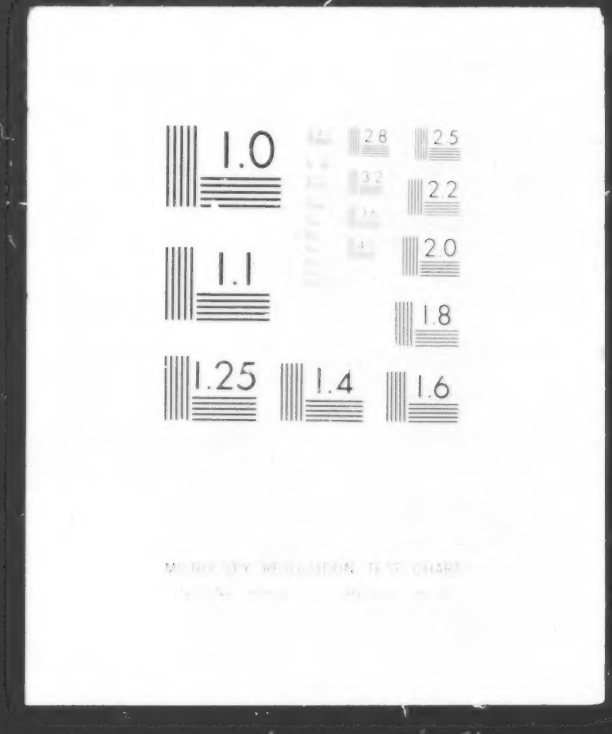
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ABSTRACT

Data collected in a fall 1975 survey of the spring 1974 graduates of the University of North Carolina at Chapel Hill (UNC-CH) were used to analyze the effects that various student characteristics have on the selection of post-college activities by bachelor's degree graduates. A 25-percent stratified, random sample was used with a response rate of 75 percent. The sample of 255 appears to be reasonably representative of the entire graduating class. Path analysis was used so that causal inferences could be drawn, but the categorical nature of some of the dependent variables requires conservative interpretation of the findings. Results indicate that grade point average, sex (men), and race (black) positively affect attendance at graduate or professional school; that student background variables have little direct affect on selection of post-college activity; that grade-point average and major field (science and math) positively influence the decision to pursue a doctorate or first professional degree (law, M.D., or D.D.S.); and that SAT scores have the strongest direct affect on grade-point average of those variables included in the study. Implications of the findings suggest that ability (achievement) is an important determinant in the lives of college graduates and that while student background variables are of much less importance, they do have some influence. (Author)

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The Effects of Sex, Race, Family Background, Major Field, and Ability on Post-College Activities pursued by Bachelor's Level Graduates of The University of North Carolina at Chapel Hill

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HE 009 896

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July 25, 1977

Abstract

Data collected in a fall, 1975 survey of the spring, 1974 graduates of The University of North Carolina at Chapel Hill (UNC-CH) were used to analyze the effects which various student characteristics have on the selection of post-college activities by bachelor's degree graduates. A twenty-five percent stratified, random sample was used with a response rate of seventy-five percent (N = 255); the sample appears to be reasonably representative of the entire graduating class. Path analysis was used so that causal inferences could be drawn, but the categorical nature of some of the dependent variables requires conservative interpretation of the findings. Generalizability of the findings is limited necessarily to recent graduates of institutions similar to UNC-CH, but the findings should be of interest to most researchers in higher education. Results indicate that grade point average, sex (men), and race (black) positively affect attendance at graduate or professional school; that student background variables have little direct affect on selection of post-college activity; that grade point average and major field (science and math) positively influence the decision to pursue a doctorate or first professional degree (law, M.D., or D.D.S.); and that SAT scores have the strongest direct affect on grade point average of those variables included in the study. Implications of the findings suggest that ability (achievement) is an important determinant in the lives of college graduates and that while student background variables are of much less importance, they do have some influence.

Table of Contents

Abstract i
Table of Contents ii
Introduction 1
Theoretical Framework 3
Student Characteristics and Post-College Activity 4
Student Characteristics and Current Income 6
Student Characteristics and Degree Being Pursued 6
Student Characteristics and Highest Degree Desired 7
Student Characteristics and SAT Scores 8
Student Characteristics and Curriculum 9
Student Characteristics and GPA 10
Summary 12
Key to variables used in the Figures 14

Figures

1. Path Model for Post-College Activity of Bachelor's Level Graduates of UNC-CH, Spring 1974 15
2. Trimmed Path Model from Figure 1 16
3. Path Model for Current Income of Employed Bachelor's Level Graduates of UNC-CH, Spring 1974 17
4. Trimmed Path Model from Figure 3 18
5. Path Model for Degree being Pursued by Bachelor's Level Graduates of UNC-CH, Spring 1974 Continuing Their Education 19
6. Trimmed Path Model from Figure 5 20
7. Path Model for Highest Degree Desired by Bachelor's Level Graduates of UNC-CH, Spring 1974 Continuing Their Education 21
8. Trimmed Path Model from Figure 7 22

Bachelor's level graduates from UNC-CH engage in a wide variety of jobs, educational programs, and other activities after receiving their degrees. The selection of which activity to pursue is largely a matter of personal choice for each individual, but it may be that certain factors influence this process so that patterns in selecting post-graduate activities are detectable among a group of graduates. The purpose of this paper is to explore the relationships between post-college activities and selected student characteristics to uncover those patterns in the selection process which may exist. The student characteristics and post-college activities used in this paper are listed below.

Variables used in this study

Student Characteristics

1. Sex
2. Race
3. Mother's education
4. Father's education
5. Parents' income
6. Size of hometown
7. SAT scores
8. Major field
9. GPA at graduation

Post-college Activities

1. Primarily employed, includes current income
2. Primarily continuing education, includes degree being pursued and highest degree desired

In addition to the main question concerning the possible effects of selected student characteristics on primary activity after graduation, six

peripheral questions, listed below, are also explored.

1. What is the relationship between selected student characteristics (the first six listed above) and Scholastic Aptitude Test (SAT) scores?
2. What is the relationship between selected student characteristics (the first seven above) and choice of major field?
3. What is the relationship between selected student characteristics (the first eight above) and final cumulative grade point average (GPA)?
4. For those graduates employed, what is the relationship between the nine selected student characteristics listed above and the annual income of the graduates?
5. For those graduates continuing their education, what is the relationship between the nine selected student characteristics listed above and the degree being pursued by these graduates?
6. For those graduates continuing their education, what is the relationship among the nine selected student characteristics outlined above, the degree being pursued, and the highest degree desired by these graduates?

Each of these questions will be dealt with in following sections of this paper. Before going into that, a few explanatory comments on the data and type of analysis used are needed.

The data are a 25% stratified random sample of the bachelor's level graduates of UNC-CH from the May 1974 graduation. All blacks were included. A total of 342 questionnaires were sent out of which 257 (75%) were returned (255 are usable). The survey was originally conducted by UNC General Administration under the direction of Art Padilla and included all 16 institutions in the consolidated university. See "The Class of '74: Early

Careers of Graduates from the Sixteen Campuses of the University of North Carolina," UNC General Administration, November, 1976, for full details of the study. Data from the individual institutions were returned to the institutions after General Administration finshed the survey, and this paper is based on the data for UNC-CH.

Unlike the General Administration study which used largely descriptive statistical measures for reviewing the data, this paper relies on more analytical techniques, primarily path analysis derived from the multiple regression subprogram of the Statistical Package for the Social Sciences (SPSS), Second Edition, 1975. The figures included in this paper present the path models resulting from these analyses and are explained more fully in the sections which follow. In general, path analysis is "a method for studying the direct and indirect effects of variables taken as causes of variables taken as effects." (Kerlinger and Pedhazur, Multiple Regression in Behavioral Research, 1973, p. 305). The usefulness of path analysis lies primarily in its ability to test theory rather than to uncover hidden relationships. In this regard, path analysis is used in this paper to test the basic theory briefly presented in the following section.

Theoretical Framework

As was mentioned earlier, graduates with bachelor degrees pursue a variety of experiences after leaving college. Given that there is a great amount of personal choice involved in the selection of a post-college activity for the individual graduate, there, nevertheless, is th_ possibility of other factors entering in so that one might say that graduates possessing

certain characteristics are more disposed to select certain activities. One could hypothesize an endless list of factors which might influence graduates in this regard, but for this paper the factors are those nine student characteristics outlined earlier. Using these characteristics and limiting the variety of post-college activities to either employment or continuing education (of our sample of 255 respondents, 242 (95%) chose one of these options), the basic theory underlying this paper is that:

> Bachelor level graduates who are male and white, who came from larger hometowns and from families with higher incomes, whose parents have more education, who have higher SAT scores and higher GPA's, and who major in the physical sciences or mathematics will be more likely to continue their education than other graduates at the bachelor level.

Student Characteristics and Post-College Activity

Figure 1 presents the path model for post-college activity and the nine student characteristics included in this paper. To reduce the complexity of the model, those relationships with a path coefficient less than 0.10 were removed as suggested by Heise's strategy of "trimming" path models (Causal Analysis, 1975), and the trimmed model is shown as Figure 2. Using this model, we find that our model accounts for 27.8% of the total variance in selection of post-college activity for the graduates in our sample. Those student characteristics which have the strongest direct effect on post-college activity are GPA ($p = 0.31$), Sex ($p = 0.20$), and

Race ($p = -0.17$).

In regards to our basic theory we find support from the model in that males and graduates with higher GPA's are more likely to choose to continue their education. Father's education, SAT scores, curriculum, and family income have some slight effects in congruence with our theory, while mother's education and size of hometown have no appreciable direct effects. Contrary to our theory, however, the negative path coefficient for race shows that black graduates are somewhat more likely to continue their education than white graduates.

From the more general perspective of the traditional status attainment model (as developed by Bruce Eckland, Professor of Sociology, UNC-CH) which is concerned with the effects of family background on the educational and occupational attainment of the children, our path model supports the theory that differences in families lead to differences among children. Thinking in terms of family "affluence" as a composite variable made up of the income level of the family and the educational level of the parents (this is often termed socioeconomic status, SES, in the literature), we find in Figure 2 that both father's education and family income are positively related to selection of post-college activity: Graduates from homes in which the father was highly educated and which had high annual incomes are more likely to continue their formal education beyond the bachelor's level. An important aspect of this, which is an integral part of the path analytical technique, is that these positive influences exist even when we control for all the other variables in the model which includes ability (as exemplified by SAT scores and GPA). Thus, the point of this discussion and the main

justification for resorting to path analysis is that the model allows us to state with some confidence that graduates from more affluent families are somewhat more likely to continue their education regardless of their other characteristics. Of course the same statement can be made for all the other variables which show direct effects on post-college activity in Figure 2, and in fact three other variables (GPA, sex, and race) have stronger effects than family affluence.

Student Characteristics and Current Income

For the path analysis of this relationship only graduates who were employed were included. Figure 3 presents the full model and Figure 4 shows the trimmed model. The total explained variance of 3.7% from the trimmed model shows that the model is insignificant in helping to explain the variation in annual incomes of our bachelor's level graduates. Some interesting findings are evident, nevertheless.

1. As one might expect, males earn slightly higher incomes than females even when all the other included variables are controlled.

2. Race apparently has no effect on income, at least in this sample.

3. The negative path coefficient between mother's education and income is contrary to what one would expect from the traditional status attainment model.

Student Characteristics and Degree Being Pursued

For those graduates who continued their education, Figures 5 and 6 show the full and trimmed path models relating degree being pursued to student characteristics. Nearly one-third of the total variance in degree pursued is explained by our model with the two strongest direct effects

coming from GPA (p = 0.43) and curriculum (p = -0.38). One is not surprised to learn that students with higher GPA's and who major in the physical sciences or mathematics are more likely to pursue doctoral and professional degrees. Except for the moderate influence of father's education, the "home" variables of parents' education, family income, and size of hometown have little influence. It is also interesting to note that race has very little influence on choice of degree and that the zero-order correlation between sex and degree (0.20) nearly disappears (0.08) when the other variables are controlled. This last finding suggests that a large part of the preponderance of males in doctoral and professional programs is actually accounted for by variables other than sex itself. For instance, Figure 6 shows a path coefficient of -0.21 between sex and curriculum (females are less likely to major in the physical sciences and math) and a path coefficient of -0.38 between curriculum and degree pursued (majors in physical science and math are more likely to be pursuing doctoral or professional degrees). So, at least a part of the initial correlation between sex and degree pursued appears to operate through choice of curriculum.

Student Characteristics and Highest Degree Desired

As the path models in Figures 7 and 8 indicate, the variables used in conjunction with highest degree desired account for more than three-quarters of the total variance of that variable. Of course the strong relationship between degree being pursued and highest degree desired (p = 0.94) tends to dominate this figure, but the trimmed model does have other interesting aspects.

1. The path coefficient between GPA and highest degree (-0.18) indicates that the brightest students may not necessarily pursue the highest level degrees as much as one would expect.

2. Unlike the negligible relationship between sex and degree pursued, there is a slight positive relationship (p = 0.11) between sex and highest degree desired.

Student Characteristics and SAT Scores

A sidelight of the main focus of this study on the differences in post-college activities of bachelor's level graduates is that the relationships between SAT scores, major field of study, and GPA with sex, race, parents' education, family income, and size of hometown can be explored at the same time. This section, and the two following, explores these relationships by looking across the eight path models already presented.

Figure 2 shows that 14.4% of the total variation in SAT scores among bachelor's level graduates is accounted for by the variables in this trimmed model. The main direct effects on SAT scores came from father's education, race, and sex, of which the only surprise is that male graduates tended to have slightly higher SAT scores than female graduates. We find some interesting changes in the number of variables influencing SAT scores and in the strength of the relationships as we look at the path models for employed graduates, Figure 4, and for graduates continuing their education, Figure 6.

Father's education disappears as a major factor influencing SAT scores for employed graduates; the sex effect is about the same; and the race effect is somewhat stronger. The surprising new variable is mother's education

although the magnitude of the relationship is not strong (p = 0.12). In looking at Figure 6, the trimmed model for graduates continuing their education, we see four major variables influencing SAT scores. Father's education again becomes important and is quite strong (p = 0.47); family income influences SAT scores for the first time but its effect is surprisingly negative; size of hometown also enters the model and race continues to have an effect. Sex no longer shows a significant relationship with SAT scores.

In general, then, the comparison of these three models demonstrates that the effects of student characteristics on SAT scores vary depending on the post-college activity chosen by the graduates. Hence, there seems to be some general support for the underlying theory upon which this paper is based: that the selection of post-college activity results from more than the personal choice of the graduates.

Student Characteristics and Curriculum

Realizing that the condensing of curriculum choices into two broad categories (1. physical sciences and math 2. all others) severely restricts the amount of variance contained in the variable, we can nevertheless see that curriculum, like SAT scores, varies with post-college activity. For all bachelor's graduates, Figure 2, curriculum is influenced by father's education, mother's education, and sex; for bachelor's graduates continuing their education, the same relationships hold true; but for bachelor's graduates employed (using Figure 3), only the direct effect of sex remains important and it is joined by family income.

Including the effects of SAT scores on curriculum, all three models support the finding that graduates with higher SAT scores were more likely to select major fields in the physical sciences and mathematics.

Student Characteristics and GPA

As grade point average (GPA) is one of the most widely used measures of student achievement in college and one of the primary factors of evaluation used by graduate schools and employers, an analysis of its relationship with our basic student characteristics is an important part of this paper. For this reason our approach to this analysis will be more extensive (some might say laborious) than it has been in some of the other sections.

For all bachelor's graduates, Figure 2, GPA is directly affected to varying degrees by nearly all the other student characteristics present in the model. Taken together these variables explain 23.5% of the total variance in final grade point average of this group of graduates. That 76.5% of the variance is explained by other variables, such as motivation or type of high school attended, does not detract from the significance of our model; it does, however, prompt us to interpret the model somewhat conservatively.

The strongest direct effect on GPA comes from SAT scores ($p = 0.34$) which can be interpreted loosely to mean that a person's ability is a strong determinant of the grades that person earns in college. Remembering that this path coefficient is calculated while holding the other variables constant, it is somewhat comforting to learn that GPA is strongly dependent on ability despite the less strong influence of such things as sex, race, family affluence, etc.

Figure 2 also presents the direct effects of the other student characteristics on GPA and these need no further comment here; however, it is of interest to comment on the insignificant relationship between race and GPA.

Figure 1 shows a zero-order correlation between race and GPA of 0.12 which reduces to a path coefficient of 0.02 when the other variables are controlled. With due caution in attempting to interpret this, it appears that this finding dispels any notion of racial differences directly effecting a graduate's competence to achieve in college.

Figure 3, for employed graduates, displays a similar pattern of relationships effecting GPA, and the effect of race on GPA remains insignificant. It is interesting to note that the strength of the relationship between SAT scores and GPA is diminished for this group of graduates, and that the effect of sex on GPA is much more pronounced ($p = -0.31$).

In considering GPA for graduates who are continuing their education, Figure 6 shows only three variables having a major, direct effect on GPA and these three account for 39.4% of the variance in GPA. This is a reduction of three in the number of variables significantly related to GPA, but it corresponds to a substantial increase in the percentage of explained variance of GPA. SAT scores show a sizable relationship to GPA ($p = 0.66$), which is a much stronger relationship than we had for all graduates or employed graduates. Mother's education shows a moderately strong path coefficient of 0.16, but it is quite surprising to find that the path coefficient between father's education and GPA is a negative figure (-0.23) for graduates continuing their education. Certainly this rather startling change in the relationship between father's education and GPA supports the idea that there are strong differences among our graduates in regards to the selection of post-college activity.

As a brief summary of this section on GPA, it is not surprising to learn that students who do well on the Scholastic Aptitude Test also tend

to achieve high GPA's. It is encouraging to find that race apparently has no direct impact on achievement in college for those students who graduate. And, we have also learned that the family background variables have varying, moderate effects on GPA.

Summary

The main purpose of this study is to see if different background characteristics of bachelor's graduates of this University have any effect on the type of experiences pursued by these graduates after they leave Chapel Hill. Our findings have shown that they do, but it is certain that one should interpret the figures conservatively. One can say, however, that a student's sex, race, and family background do influence his or her decision to go on to graduate school, and that the student's SAT scores, choice of curriculum, and GPA also have an effect. It appears that the strongest direct effect on choice of post-college activity comes from GPA in that students with higher GPA's are more likely to continue their education after getting a bachelor's degree even when all the other variables are held constant. One possible interpretation of these findings is that students who do well at UNC-CH have a roughly equal chance of going on to graduate or professional school, if they choose to do so, regardless of their family background.

In looking at the current, annual incomes of employed graduates, our findings show nearly no relationships between that variable and the background characteristics included in the study.

For graduates continuing their education, we find that GPA and choice of major field have the strongest direct effects on the type of degree being

pursued.

As a secondary part of this study, our findings have shown that background characteristics do have some effect on SAT scores, major field, and GPA, and that the traditional status attainment model seems valid. A significant outcome of this work is the negligible effects of race in most of the models. For our bachelor's level graduate at least, it seems apparent that race is not a particularly important characteristic in regards to achievement in college, selection of post-college activity, income, or degree being pursued.

Another important finding, if one accepts SAT scores as a rough estimate of ability, is that the strongest influence on achievement in college (GPA) is ability (SAT scores) when the other variables are held constant. Combining this with the other previously mentioned findings which deal with this same area, this paper provides support for the meritocratic ideal which places the primary importance on individual ability in determining individual success.

KEY for interpreting the path models, Figures 1-8

For each arrow, the lower number is a zero-order correlation coefficient, and the upper number is a path coefficient.

SEX:
(1) Female
(2) Male

RACE:
(1) Black
(2) White

HOME: Size of hometown
(1) Less than 50,000
(2) 50,000 - 200,000
(3) Suburb of large city
(4) More than 200,000

MOMED: Mother's education, and

POPED: Father's education
(1) Less than high school grad
(2) High school grad
(3) Some college
(4) College grad
(5) Some beyond college

INCOME: Parents' family income
(1) Less than $6,000
(2) $6,000 - 10,000
(3) $10,001 - 15,000
(4) $15,001 - 20,000
(5) $20,001 - 25,000
(6) More than $25,000

SAT: Sat scores
(1) 400-600
(2) 600-800
(3) 800-1000
(4) 1000-1200
(5) 1200-1400
(6) 1400-1600

CURR: Curriculum at UNC-CH
(1) Physical sciences & math
(2) All others

GPA: Grade Point Average at graduation
(1) 2.0 - 2.4
(2) 2.5 - 2.9
(3) 3.0 - 3.4
(4) 3.5 - 4.0

PCACT: Primary current activity after graduation
(1) Employed
(2) Continuing education

CURINC: Current income of employed graduates
(1) Less than $6,000
(2) $6,000 - 9,000
(3) $9,001 - 12,000
(4) $12,001 - 15,000
(5) $15,001 - 20,000
(6) More than $20,000

DEG: Degree being pursued, and

HIDEG: Highest degree desired
(1) Bachelors
(2) Masters
(3) Doctorate
(4) First Professional

Many thanks to P. Michael McCulley for his fine work drawing the eight figures which follow.

Figure 1. Path Model for Post-College Activity of Bachelor's Level Graduates of UNC-CH, Spring 1974.

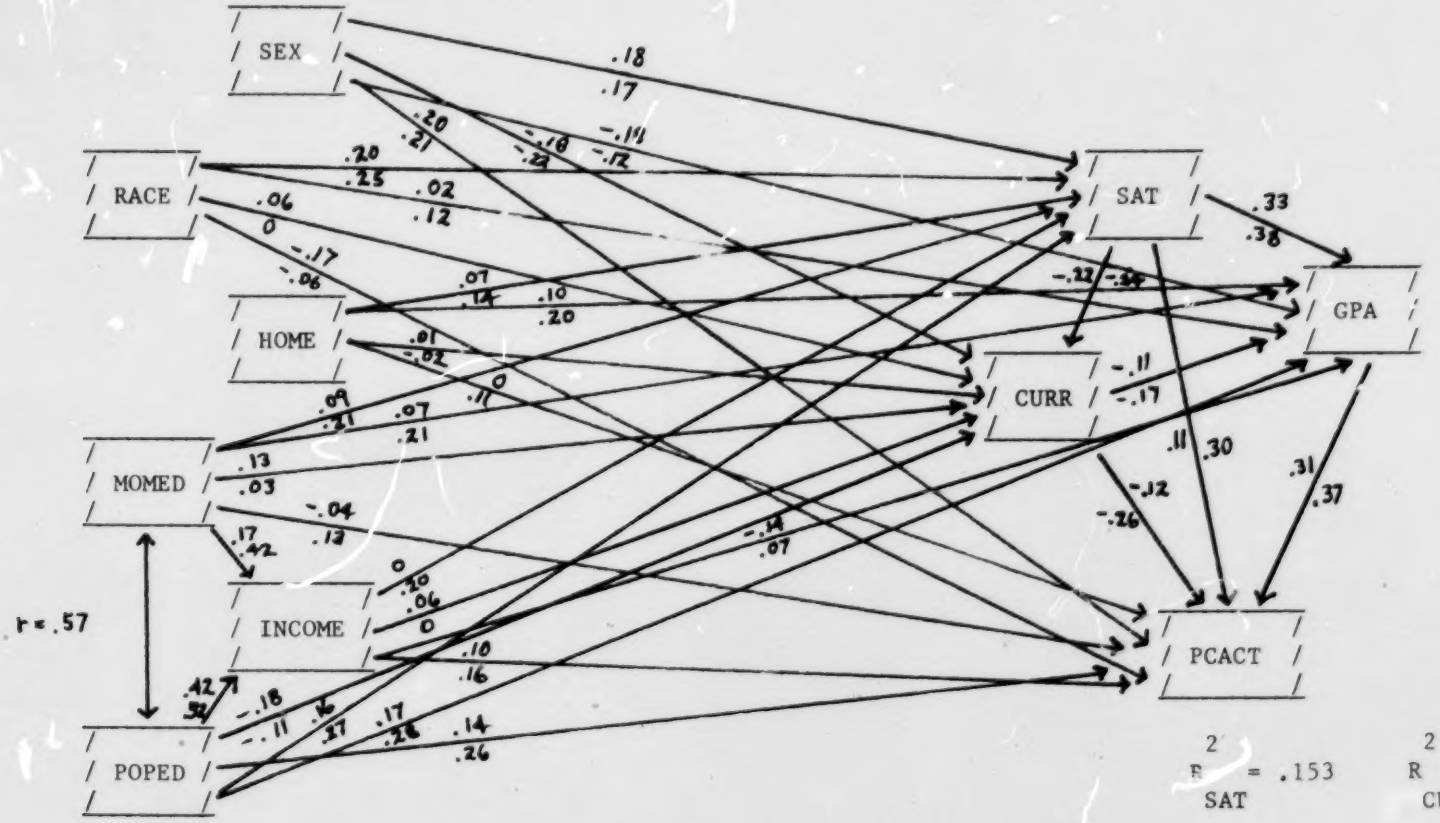
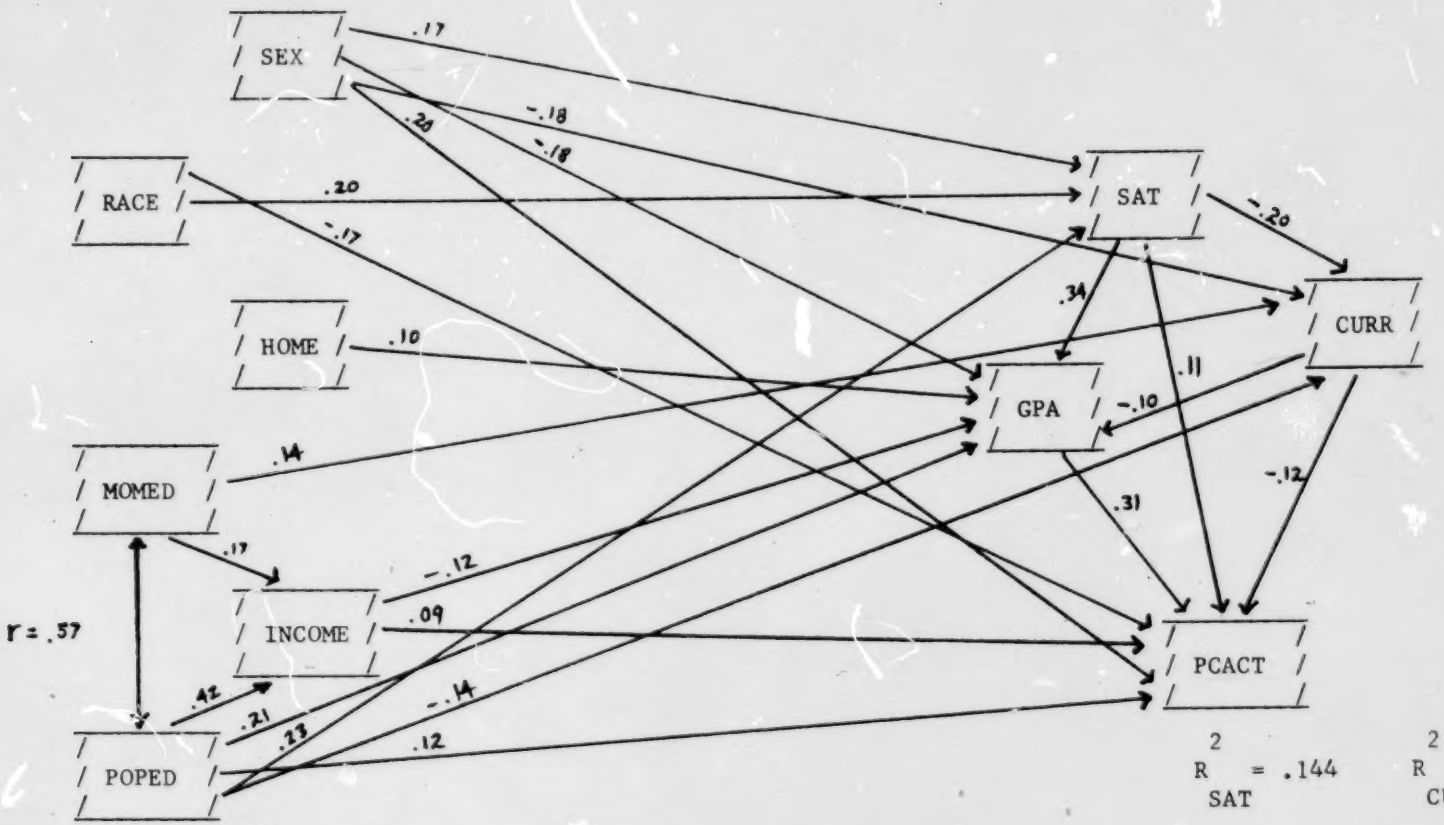


Figure 2. Trimmed Path Model ($|p| \geq 0.10$) for Post-College Activity of Bachelor's Level Graduates of UNC-CH, Spring 1974.

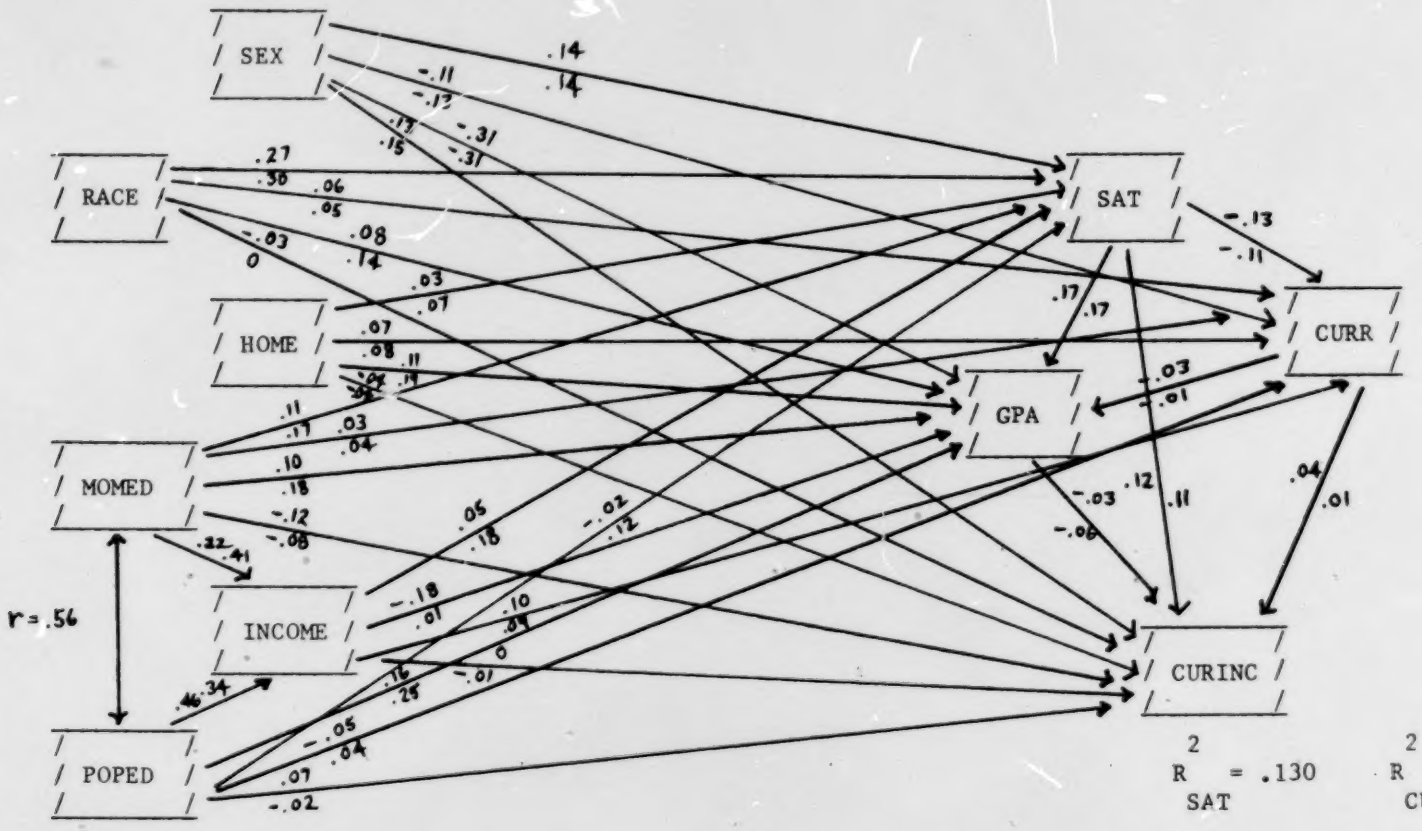


$R^2_{INCOME} = .295$

$R^2_{SAT} = .144$ $R^2_{CURR} = .108$

$R^2_{GPA} = .235$ $R^2_{PCACT} = .278$

Figure 3. Path Model for Current Income of Employed Bachelor's Level Graduates of UNC-CH, Spring 1974.



$R^2_{INCOME} = .248$

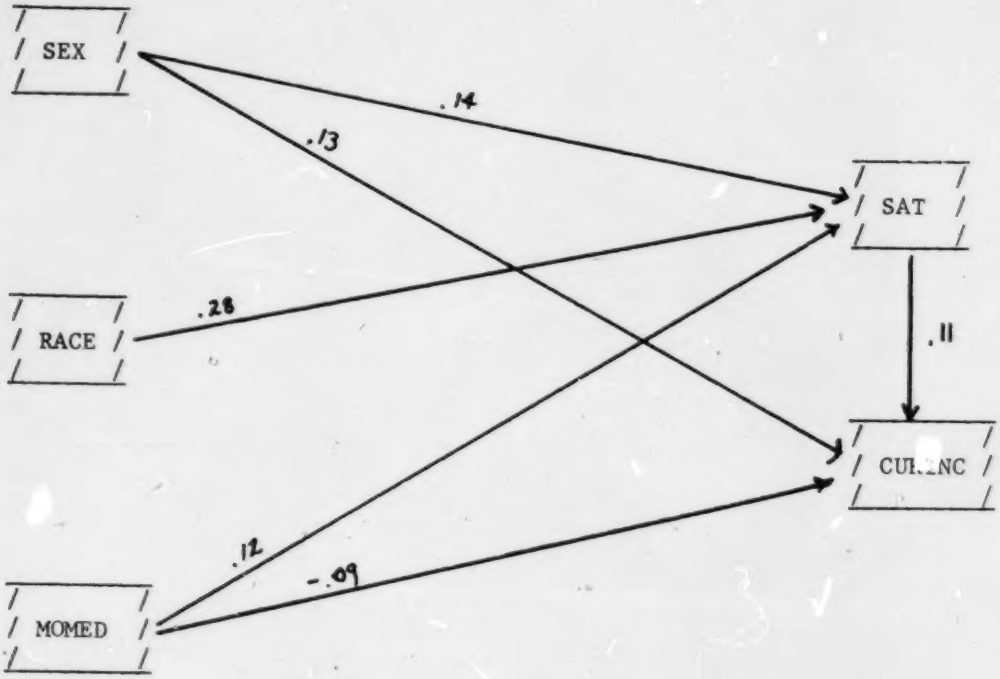
$R^2_{SAT} = .130$

$R^2_{GPA} = .212$

$R^2_{CURR} = .045$

$R^2_{CURINC} = .043$

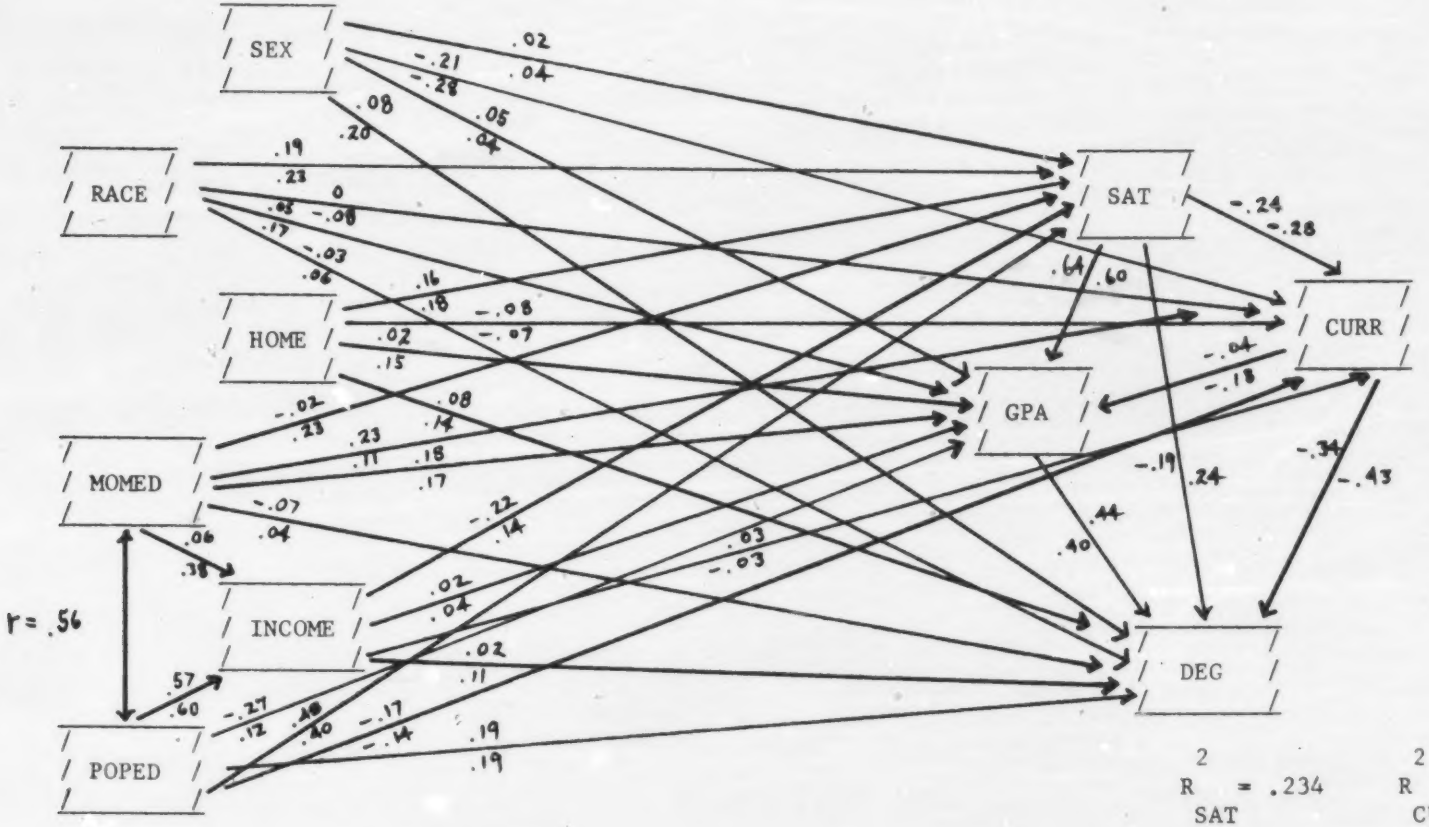
Figure 4. Trimmed Path Model ($|p| \geq 0.10$) for Current Income of Employed Bachelor's Level Graduates of UNC-CH, Spring 1974.



$R^2_{SAT} = .126$

$R^2_{CURINC} = .037$

Figure 5. Path Model for Degree Being Pursued by Bachelor's Level Graduates of UNC-CH, Spring 1974 Continuing Their Education.



$R^2_{SAT} = .234$ $R^2_{CURR} = .184$

$R^2_{INCOME} = .364$ $R^2_{GPA} = .403$ $R^2_{DEG} = .336$

Figure 6. Trimmed Path Model ($|p| \geq 0.10$) for Degree Being Pursued by Bachelor's Level Graduates of UNC-CH, Spring 1974 Continuing Their Education.

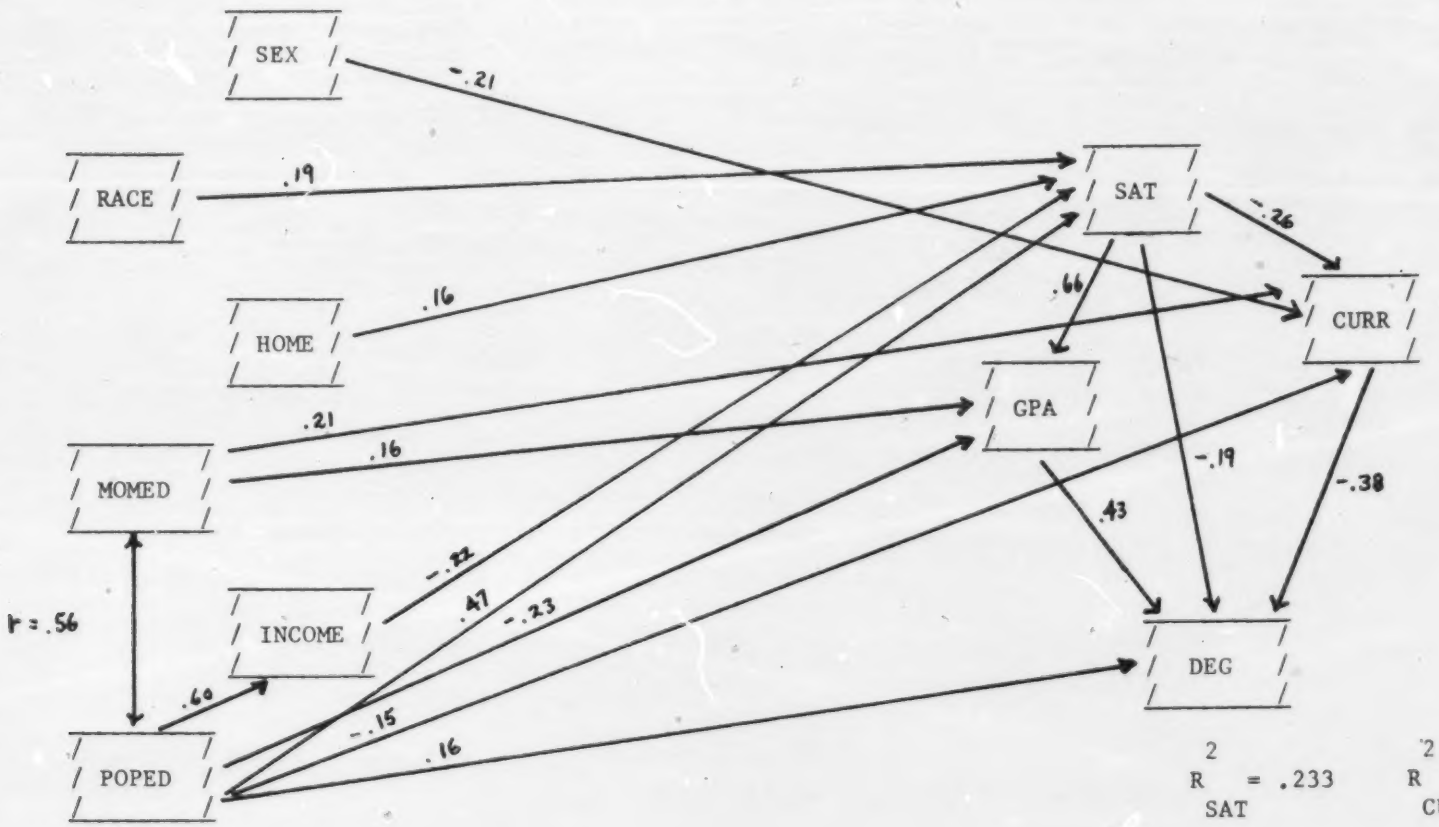
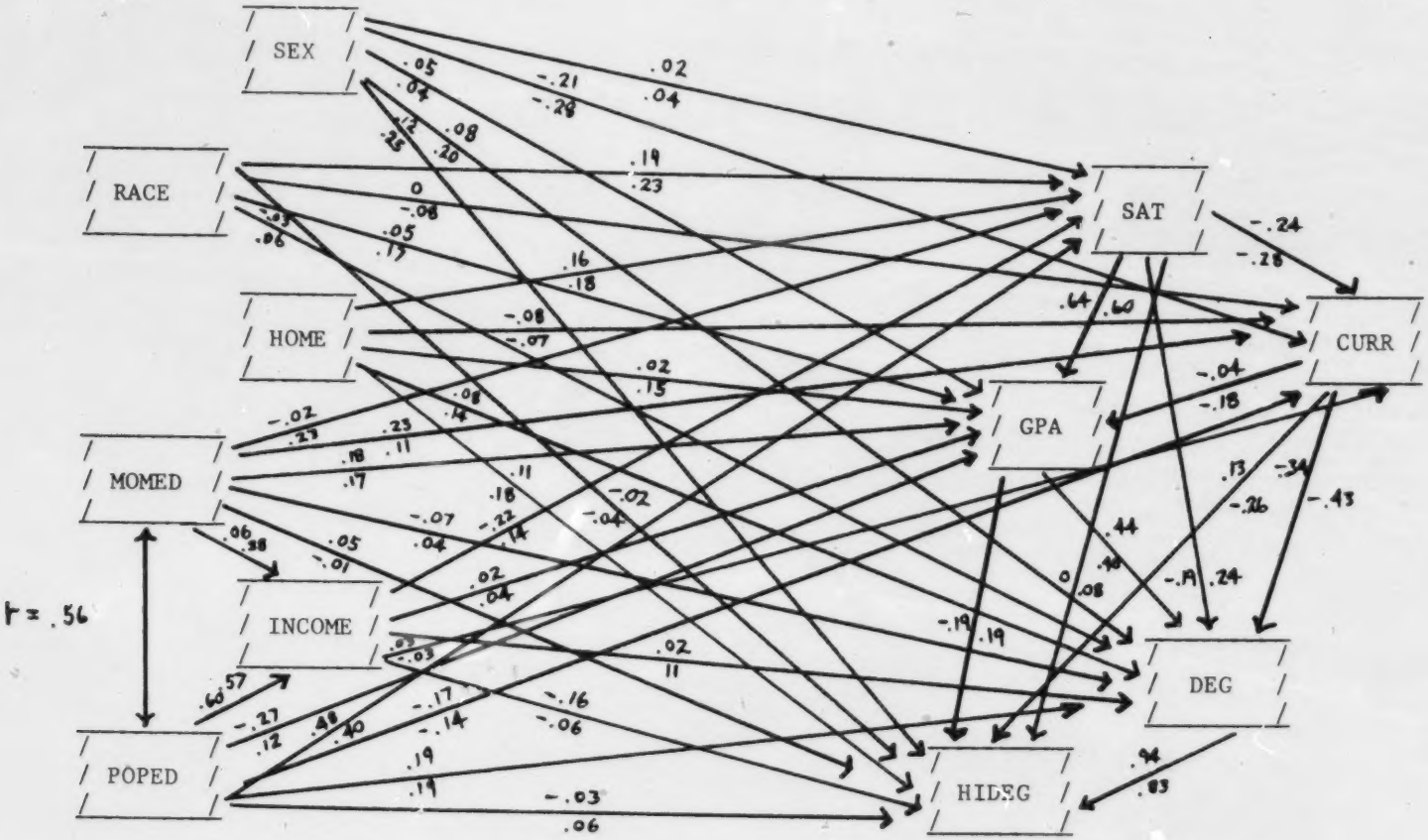


Figure 7. Path Model for Highest Degree Desired by Bachelor's Level Graduates of UNC-CH, Spring 1974 Continuing Their Education.

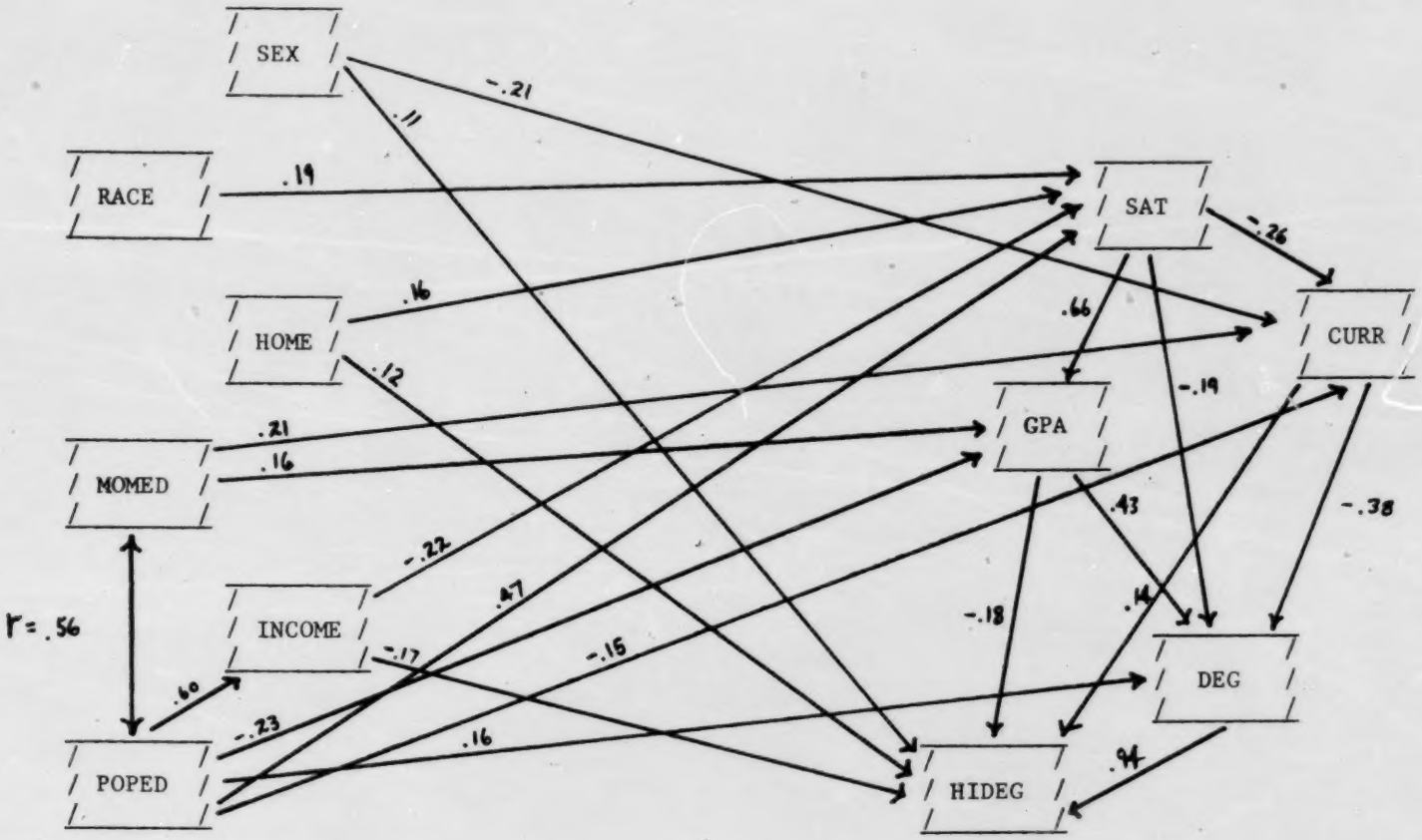


$R^2_{INCOME} = .364$

$R^2_{SAT} = .234$ $R^2_{CURR} = .184$ $R^2_{GPA} = .403$

$R^2_{DEG} = .336$ $R^2_{HIDEG} = .770$

Figure 8. Trimmed Path Model ($|p| \geq 0.10$) for Highest Degree Desired by Bachelor's Level Graduates of UNC-CH, Spring 1974 Continuing Their Education.



$R^2_{INCOME} = .362$

$R^2_{SAT} = .233$ $R^2_{CURR} = .177$ $R^2_{GPA} = .394$

$R^2_{DEG} = .320$ $R^2_{HIDEG} = .768$